(19)日本国特許庁（ＪＰ）　(12)公開特許公報（Ａ）　(11)特許出願公開番号
特開平9－131659
(43)公開日　平成９年(1997)５月20日

(51)Int.Cl.⁶	識別記号	庁内整理番号	ＦＩ		技術表示箇所
Ｂ２４Ｂ　37/00			Ｂ２４Ｂ　37/00	Ｃ	
				Ａ	
Ｈ０１Ｌ　21/304	３２１		Ｈ０１Ｌ　21/304	３２１Ｚ	
	３４１			３４１Ｚ	

審査請求　有　請求項の数５　ＯＬ　（全６頁）

(21)出願番号　特願平7－288402

(22)出願日　平成７年(1995)11月７日

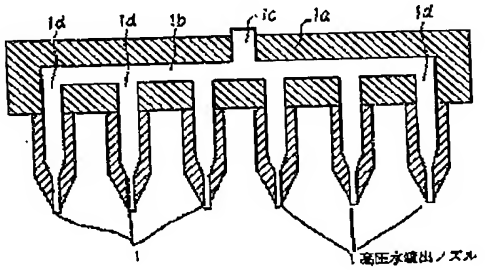
(71)出願人　000004237
日本電気株式会社
東京都港区芝五丁目７番１号

(72)発明者　磯部　晶
東京都港区芝五丁目７番１号　日本電気株式会社内

(74)代理人　弁理士　菅野　中

(54)【発明の名称】　研磨布の表面調整方法及び機構

(57)【要約】
【課題】　研磨装置において研磨布の表面状態の回復のために行われるコンディショニングを高圧水により行う。
【解決手段】　基板の研磨が終わる毎に高圧水ノズル１から研磨布の表面に高圧水を噴出し、研磨布表面の凹凸に詰まった研磨屑を除去し、かつ研磨布表面に凹凸を再生する。



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【特許請求の範囲】

【請求項１】　基板表面の平滑研磨用研磨布の表面を調整する研磨布の表面調整方法であって．

液体を加圧して研磨布の表面に噴射し．研磨布表面に詰まった研磨屑を除去し、かつ研磨布表面の目立てを行って研磨布表面に凹凸を再生することを特徴とする研磨布の表面調整方法。

【請求項２】　研磨屑除去処理と、目立て処理とを併用し．基板表面の平滑研磨用研磨布の表面を調整する研磨布の表面調整方法であって．

研磨屑除去処理は、液体を加圧して研磨布の表面に噴射し．研磨布表面に詰まった研磨屑を除去する処理．及び／または研磨布の表面にプレートの凹凸を押付けて両者を相対回転させ．研磨布表面に詰まった研磨屑を除去する処理であり．

目立て処理は．研磨屑が除去された研磨布の表面にプレートの凹凸を押付けて両者を相対回転させ、プレートの凹凸により研磨布の表面を目立てして研磨布の表面に凹凸を再生する処理、及び／または研磨屑が除去された研磨布の表面に液体を加圧して噴射し．研磨布の表面を目立てして研磨布の表面に凹凸を再生する処理であることを特徴とする研磨布の表面調整方法。

【請求項３】　表面調整部を有し、基板表面の平滑研磨用研磨布の表面を調整する研磨布の表面調整機構であって．

表面調整部は．複数の高圧水噴出ノズルを有し．加圧した液体を該ノズルより研磨布の表面に噴射することにより液圧をもって研磨布表面の研磨屑の除去と研磨布表面の目立てとを行うものであることを特徴とする研磨布の表面調整機構。

【請求項４】　表面調整部を有し、基板表面を平滑に研磨する研磨布の表面を調整する研磨布の表面調整機構であって、

表面調整部は．ノズルと．表面に凹凸をもつプレートとからなり、

ノズルは、加圧した液体を研磨布の表面に噴射することにより、液圧をもって研磨布の表面を調整するものであり．

プレートは、凹凸を研磨布の表面に擦付けて研磨布の表面を調整するものであることを特徴とする研磨布の表面調整機構。

【請求項５】　前記ノズルは、プレートの凹凸をもつ面の周囲に配置したものであることを特徴とする請求項４に記載の研磨布の表面調整機構。

【発明の詳細な説明】

【０００１】

【発明の属する技術分野】本発明は研磨布の表面調整方法および機構に関し、特に．半導体表面の凹凸を研磨平坦化するのに用いる研磨布の表面調整方法および機構に関する。

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【０００２】

【従来の技術】研磨により基板表面を平滑化する技術は．半導体基板の作製工程をはじめとし、あらゆる分野で用いられてきた。一方．近年、半導体基板上のデバイス作製工程においても、作製の過程で形成される表面の凹凸．例えば層間絶縁膜表面の凹凸を研磨により平坦化する化学機械研磨法が採用されつつある。この方法では．半導体基板等の基板表面を研磨する場合に用いられる不織布を材料とする比較的柔らかめの研磨布と異なり．絶縁膜の平坦化を行うために、発泡ポリウレタン等の材料からなる硬めの研磨布が用いられる。

【０００３】発泡ポリウレタンを材料とする研磨布を用いる場合には．研磨を進めていくうちに研磨布表面の凹凸が研磨剤や研磨屑により埋め込まれ．研磨布自体も表面の凹凸が平滑化されて．研磨レートが徐々に下がるという減少が生じる。この現象を避けるために、通常、ダイヤモンドプレートを用いた研磨布表面調整（以下、コンディショニングという）が行われる。図１０はこうした研磨に用いられる研磨装置の構成を示す図である。

【０００４】図１０に示した研磨装置は、基板を保持する基板保持部６と、上面に研磨布７が貼られた研磨テーブル３と、研磨剤供給口８と、コンディショニング機構（以下、コンディショナーという）２とから構成されている。基板保持部６，コンディショナー２には回転，揺動．加圧機構が付帯しており、研磨テーブル３には回転機構が付帯しているが、これらは図面上に省略している。コンディショナー２は．金属板に１５０μｍ程度のダイヤモンドパーティクルを固着したダイヤモンドプレート５を有している。

【０００５】研磨の手順について説明すると、まず、研磨剤供給口８から研磨剤を研磨布７上に流しながら研磨布８を回転し．研磨剤を研磨布７の全面に行き渡らせる。次に基板保持部６を回転させながら、基板保持部に保持された基板を研磨布７に押し付けることにより、基板表面の研磨を行う。必要に応じて基板を研磨布７に対して揺動させて研磨を行う．研磨条件としては．例えば研磨布７の回転数＝２０ＲＰＭ，基板の回転数＝２０ＲＰＭ、基板を研磨布７に押し付ける荷重＝５００ｇ／ｃｍ²に設定し、基板の研磨を行う。

【０００６】研磨終了後．基板保持部６により基板を研磨布７から引き上げて、処理の終わった基板を次に処理する基板と交換している間にコンディショナー２によりダイヤモンドプレート５を回転させながら研磨布７に押し付けることにより、研磨布７表面のコンディショニングを行う。すなわちダイヤモンドプレート５により研磨布７の表面を目立てして研磨用の凹凸を再生する。

【０００７】コンディショニング条件としては．例えば研磨布７の回転数＝２０ＲＰＭ，ダイヤモンドプレート５の回転数＝２０ＲＰＭ．ダイヤモンドプレート５を研磨布７に押し付ける荷重＝１００ｇ／ｃｍ²に設定し．

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コンディショニングを行う。

【０００８】コンディショニング終了後、次の基板の研磨を行い、以後研磨とコンディショニングを交互に繰り返す。

【０００９】

【発明が解決しようとする課題】ところが、上述した従来の研磨布表面調整方法では、コンディショニングの際にダイヤモンドがダイヤモンドプレート５から欠落し、研磨中に研磨布と基板の間にダイヤモンドが入り込むことによって、基板表面に傷を付ける場合がある。またプレート５からダイヤモンドの欠落がなくとも、ダイヤモンドの表面が平滑化され、研磨布をコンディショニングする能力が低下し、研磨布の研磨レートが安定しないという問題点があった。

【００１０】このようにプレート５からダイヤモンドが欠落したり或いは摩耗する原因は、コンディショニング条件、特にコンディショナー荷重が高すぎることにある。コンディショニングによる研磨レート回復のメカニズムは、前述したように、研磨布表面の凹凸に詰まった研磨屑を取り除く効果と、平滑化された研磨布自体の表面に凹凸を再生させる効果の二つが組み合わさったものである。

【００１１】ところが、プレート５にダイヤモンドパーティクルを電着した構造のものは、表面に凹凸を再生するのに効果的であるが、研磨屑を取り除くには効率的でなく、十分に研磨屑を取り除くには大きな荷重を必要とし、その結果ダイヤモンドの欠落や摩耗を引き起こすこととなる。

【００１２】本発明の目的は、基板を保護し、かつコンディショニング能力の低下に伴う研磨レートの不安定化を抑える研磨布の表面調整方法及び機構を提供することにある。

【００１３】

【課題を解決するための手段】前記目的を達成するため、本発明に係る研磨布の表面調整方法は、基板表面の平滑研磨用研磨布の表面を調整する研磨布の表面調整方法であって、液体を加圧して研磨布の表面に噴射し、研磨布表面に詰まった研磨屑を除去し、かつ研磨布表面の目立てを行って研磨布表面に凹凸を再生するものである。

【００１４】また、本発明に係る研磨布の表面調整方法は、研磨屑除去処理と、目立て処理とを併用し、基板表面の平滑研磨用研磨布の表面を調整する研磨布の表面調整方法であって、研磨屑除去処理は、液体を加圧して研磨布の表面に噴射し、研磨布表面に詰まった研磨屑を除去する処理、及び／または研磨布の表面にプレートの凹凸を押付けて両者を相対回転させ、研磨布表面に詰まった研磨屑を除去する処理であり、目立て処理は、研磨屑が除去された研磨布の表面にプレートの凹凸を押付けて両者を相対回転させ、プレートの凹凸により研磨布の表面を目立てして研磨布の表面に凹凸を再生する処理、及び／または研磨屑が除去された研磨布の表面に液体を加圧して噴射し、研磨布の表面を目立てして研磨布の表面に凹凸を再生する処理である。

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【００１５】また、本発明に係る研磨布の表面調整機構は、表面調整部を有し、基板表面の平滑研磨用研磨布の表面を調整する研磨布の表面調整機構であって、表面調整部は、複数の高圧水噴出ノズルを有し、加圧した液体を該ノズルより研磨布の表面に噴射することにより液圧をもって研磨布表面の研磨屑の除去と研磨布表面の目立てとを行うものである。

【００１６】また、本発明に係る研磨布の表面調整機構は、表面調整部を有し、基板表面を平滑に研磨する研磨布の表面を調整する研磨布の表面調整機構であって、表面調整部は、ノズルと、表面に凹凸をもつプレートとからなり、ノズルは、加圧した液体を研磨布の表面に噴射することにより、液圧をもって研磨布の表面を調整するものであり、プレートは、凹凸を研磨布の表面に擦付けて研磨布の表面を調整するものである。

【００１７】また、前記ノズルは、プレートの凹凸をもつ面の周囲に配置したものである。

【００１８】基本的には高圧水噴出ノズルから加圧した液体を研磨布の表面に噴射して、研磨布の表面から研磨屑を取り除き、かつ研磨布の表面に凹凸を再生する。

【００１９】

【発明の実施の形態】以下、本発明を図により説明する。

【００２０】図において、本発明に係る研磨布の表面調整機構は基本的構成として、複数の高圧水噴出ノズルを有し、該ノズルから加圧した液体を研磨布の表面に噴射して、その液圧をもって研磨布の表面を調整するようにしたものであり、液圧を調整することにより、高圧水噴出ノズル単独で研磨布表面からの研磨屑の除去と研磨布表面の目立て（凹凸の再生）とを行って表面調整を行う、或いは高圧水噴出ノズルと凹凸をもつプレートとの併用により表面調整を行うようになっている。次に本発明を実施形態により具体的に説明する。

【００２１】図１は本発明の実施形態１を示す断面図、図２は同底面図、図３は表面調整状態を示す図である。尚、図３には、図１０に示した基板保持部６，研磨剤供給口８は省略してある。

【００２２】図１において本発明の実施形態１に係る研磨布の表面調整機構は、ノズル本体１ａと複数の高圧水噴出ノズル１，１…とからなっている。

【００２３】ノズル本体１ａは内部に流路１ｂを有し、その流路１ｂには加圧液体を取入れる液体取入口１ｃが接続されており、流路１ｂからは枝流路１ｄが分岐され、その枝流路１ｄは直線状に配列されている。ノズル１，１…は、ノズル本体１ａの各枝流路１ｄにそれぞれ接続されている。

【００２４】ノズル本体１ａは、ノズル１を下方に向けてコンディショナー２に取付けられ、研磨テーブル３の上方に昇降可能に設置されている。またノズル本体１ａは、回転する研磨テーブル３の半径方向に揺動可能に設置されている。ノズル本体１ａを昇降及び揺動させる機構は、汎用のものが用いられる。また研磨テーブル３の上面には研磨布７が張付けてある。

【００２５】実施形態１において、研磨テーブル３の研磨布７をもって基板表面の平滑化のための研磨を行う。その研磨が終了した時点で、ノズル本体１ａを下降させてノズル１の高さ位置を調整し、高圧水噴出ノズル１から加圧した液体を研磨テーブル３の研磨布７に向けて噴射する。その際、研磨布７は回転させ、かつノズル本体１ａを研磨布７に対して研磨テーブル３の半径方向に揺動させる。

【００２６】高圧水噴出ノズル１から加圧した液体が研磨布７に噴射されると、その液圧により、研磨布７の表面に詰まった研磨屑が表面に浮き上げられ、水流により研磨布７の表面から排除される。

【００２７】同時に高圧水噴出ノズル１からの液体の圧力により研磨布７の表面の起毛が促進されて目立てが行われ、研磨布７の表面に凹凸が再生される。

【００２８】以上のように基板を研磨する間の処理としてコンディショニングを行うが、コンディショニング条件の一例は、研磨布７の回転数＝６０ＲＰＭ，ノズル１から噴射する高圧水の噴出出力＝５００Ｋｇ／ｃｍ²，ノズル１から高圧水を噴射する噴出径＝２ｍｍφ，ノズル本体１ａの揺動速度＝１ｃｍ／秒，ノズル本体１ａの揺動範囲＝研磨布７の中心～外周，ノズル本体１ａの揺動回数＝１回である。この条件は高圧水噴出ノズルの配列，研磨布の材料，研磨布の目立ての条件等により最適値が変化することはいうまでもない。

【００２９】図４は本発明の実施形態２を示す断面図，図５は同底面図．図６はコンデイショニング状態を説明する図である。

【００３０】本発明の実施形態２では，ノズル本体１ａを円盤状に形成し，ノズル本体１ａに高圧水噴射ノズル１を複数装備し，しかもノズル１の向きをノズル本体１ａの中心軸に対して一定方向に傾斜させている。

【００３１】本実施形態では，ノズル本体１ａを回転させて，図６のようにノズル１から噴射される液体が高圧水の軌跡４のように，その向きが３６０°変化させるようにすることにより，ノズル１からの液体が広い面積で研磨布７に噴射されるようにしている。

【００３２】以上の実施形態は、ノズル単独で研磨布表面からの研磨屑の除去と研磨布表面の目立て（凹凸の再生）とを行って研磨布の表面調整を行う場合について説明したが，これに限られるものではない。

【００３３】図２に示すように高圧水噴射ノズル１を備えたコンデイショナー２と，凹凸をもつプレート，例えば図７のようにダイヤモンドパーテイクルを固着したプレート５を備えたコンディショナー２ａとの併用により研磨布７の表面調整を行うようにしてもよい。この場合，ノズル１からの高圧水の噴射に基づいて研磨布表面の凹凸に詰まった研磨屑を除去し，ダイヤモンドパーティクルを固着したプレート５により研磨布表面に凹凸を再生する。このときの高圧水噴出ノズル１によるコンディショニング条件は，研磨布７の回転数＝６０ＲＰＭ，ノズル１からの高圧水噴出圧力＝１００Ｋｇ／ｃｍ²，高圧水噴出径＝２ｍｍφ，揺動速度１ｃｍ／秒，揺動範囲＝テーブル中心～テーブル外周，揺動回数＝１回に設定し，またダイヤモンドパーティクルを固着したプレート５によるコンディショニング条件は，定盤回転数＝２０ＲＰＭ，基板回転数＝２０ＲＰＭ，荷重３０ｇ／ｃｍ²に設定してある。

【００３４】コンディショニングに求められる二つの効果を，それぞれ効果的な二つの方法に分担させているため，どちらの条件も単独でコンディショニングを行う場合よりも弱くなっている。そのため，プレート５からのダイヤモンド脱落の危険性は大幅に小さくなり，また，プレート５のダイヤモンド摩耗によるコンディショニング効果の劣化も小さい。

【００３５】図７は処理基板枚数２００枚毎に研磨布を交換し、研磨布毎の研磨レートの低下量をコンディショナーの処理枚数に対してプロットしたものである。従来法ではコンディショニング処理枚数８０００枚を越えるとコンディショニング効果が著しく低下するが，本発明によるノズルを用いて調整方法を単独で用いた場合にはコンディショニング効果の低下は全くない。また，本発明によるノズルとプレートとを併用した場合もコンディショニング効果の低下は著しく小さい。本発明によるノズルとプレートとを併用の場合にはそれぞれの条件を軽いものとすることができるため、ダイヤモンドコンディショナーの駆動能力や、高圧水のポンプ能力を小さくすることができるため、結果的に高圧水単独の場合よりも装置コストを下げることも可能となる。

【００３６】また，本発明によるノズルとプレートとを併用する例としては、ダイヤモンドプレート５によるコンディショニングと高圧水噴出ノズル１によるコンディショニングを別々に行い，いずれか一方を行った後に連続して他方を行う方法を用いてもよい。

【００３７】図８，９に示すように二つの方式を一体化させたコンディショナーにより、同時に行っても構わない。図８，９に示したコンディショナーの例は，ダイヤモンドパーティクルが固着されたプレート５の周囲に高圧水噴出ノズル１が配されており，回転しながら研磨布上を揺動することによりコンディショニングを行う。もちろん，このコンディショナーを用いてダイヤモンドによるコンディショニングと高圧水によるコンディショニングを別々に行っても何ら問題はない。

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【００３８】

【発明の効果】以上説明したように本発明によれば、液体を高圧で研磨布に噴射することにより、研磨布表面の目立てと、研磨布表面の凹凸に詰まった研磨屑の除去を同時に行うことができ、研磨レートを一定に保つことができる。このとき、ダイヤモンド等の固体を研磨布に擦り付ける従来の方法とは異なり、固体の脱落の心配がないため、研磨基板に傷を生じさせる恐れがなく、また、固体の表面劣化による表面調整効果の変動もない。

【００３９】また高圧水噴出ノズルによるコンディショニングと、ダイヤモンドパーティクルを固着したプレートによるコンディショニングとを併用することができ、この場合、研磨屑の除去は高圧液体の噴射により行うことができ、ダイヤモンド等による表面調整の条件は従来法に比べ軽いものとなり、脱落の危険性や、摩耗による表面調整効果の劣化を大きく軽減することができる。

【図面の簡単な説明】

【図１】本発明の実施形態１を示す断面図である。

＊【図２】同底面図である。

【図３】コンディショニングの状態を示す図である。

【図４】本発明の実施形態２を示す断面図である。

【図５】同底面図である。

【図６】コンディショニングの状態を示す図である。

【図７】本発明の効果を示す図である。

【図８】本発明の実施形態３を示す断面図である。

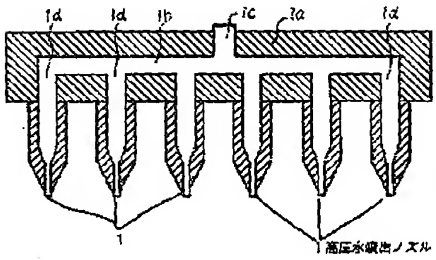
【図９】同底面図である。

【図１０】従来例を示す図である。

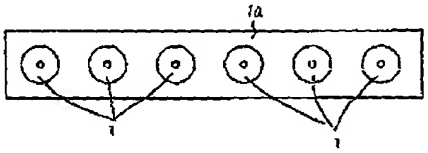
【符号の説明】

1　高圧水噴出ノズル
2　コンディショナー
3　研磨テーブル
4　高圧水の軌跡
5　ダイヤモンドプレート
6　基板保持部
7　研磨布
8　研磨剤供給口

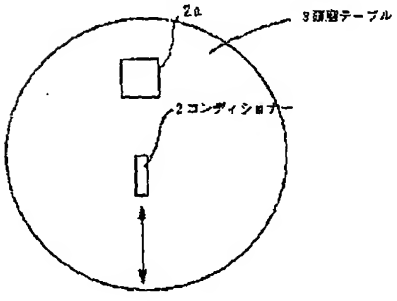
【図１】



【図２】



【図３】



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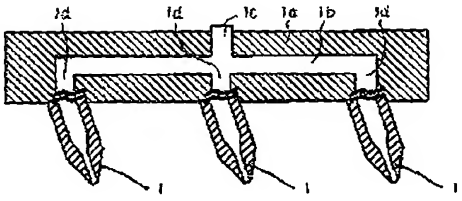

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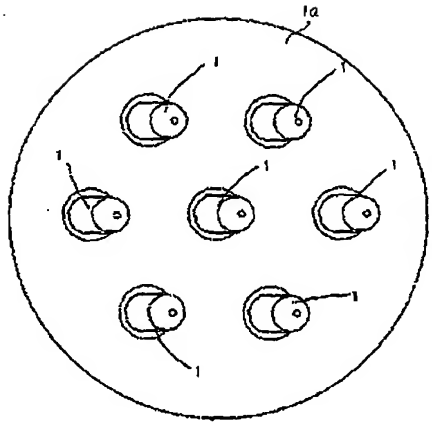

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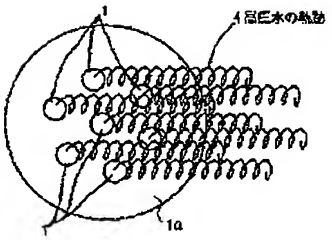

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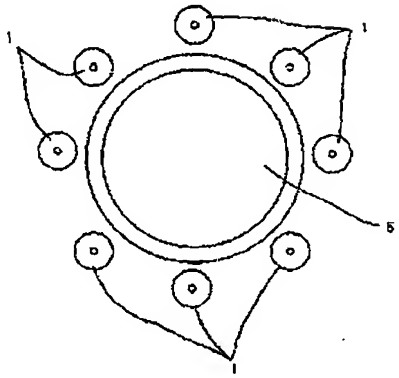

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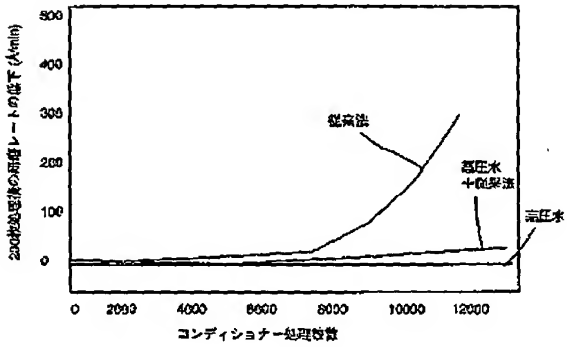

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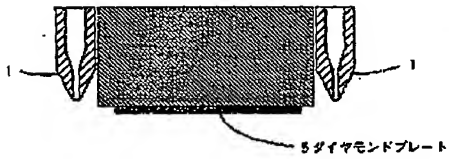

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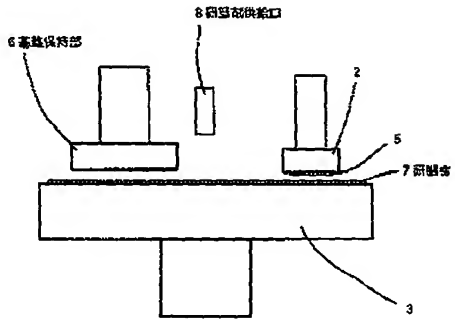


PATENT ABSTRACTS OF JAPAN

(11)Publication number : 09-131659
(43)Date of publication of application : 20.05.1997

(51)Int.Cl. B24B 37/00
H01L 21/304
H01L 21/304

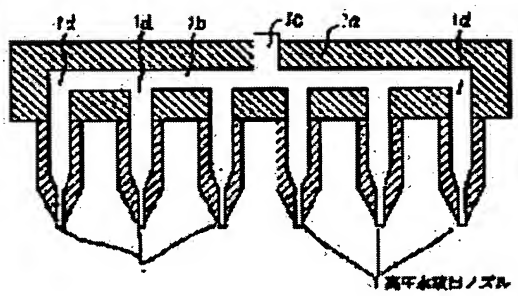
(21)Application number : 07-288402
(22)Date of filing : 07.11.1995

(71)Applicant : NEC CORP
(72)Inventor : ISOBE AKIRA

(54) METHOD AND MECHANISM FOR ADJUSTING SURFACE OF GRINDING CLOTH

(57)Abstract:
PROBLEM TO BE SOLVED: To suppress unstabilization of the grinding rate associated with deterioration of the conditioning ability by pressurizing the liquid to be sprayed on a grinding cloth, removing grinding chips clogged in the surface, and sharpening the surface to regenerate the ruggedness of the surface and to protect a substrate.

SOLUTION: A liquid inlet 1c to take in the pressurized liquid into an inside flow passage 1b is connected to a nozzle body 1a, branch flow passages 1d are branched from the flow passage 1b, and nozzles 1, 1... are respectively connected to each branch flow passages 1d. When grinding of the substrate surface is completed by the grinding cloth of a grinding table, the nozzle body 1a is lowered, and the pressurized liquid is sprayed from high pressure water spray nozzles 1, 1... toward the grinding cloth of the grinding table. Grinding chips clogged in the surface of the grinding cloth are floated on the surface by the liquid pressure, and removed by the water flow. Raising of the surface of the grinding cloth is promoted by the liquid pressure from the high pressure water spray nozzle 1, and sharpening is performed to regenerate the ruggedness on the surface.



LEGAL STATUS

[Date of request for examination]	07.11.1995
[Date of sending the examiner's decision of rejection]	
[Kind of final disposal of application other than the examiner's decision of rejection or application converted registration]	
[Date of final disposal for application]	
[Patent number]	2833549
[Date of registration]	02.10.1998
[Number of appeal against examiner's decision	

of rejection]
[Date of requesting appeal against examiner's decision of rejection]
[Date of extinction of right]

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CLAIMS

[Claim(s)]

[Claim 1] The surface-control method of the abrasive cloth characterized by being the surface-control method of the abrasive cloth which adjusts the front face of the abrasive cloth for smooth polish on the front face of a substrate, pressurizing a liquid, injecting on the surface of an abrasive cloth, and removing the polish waste got blocked in the abrasive-cloth front face, and performing dressing on the front face of an abrasive cloth, and reproducing irregularity on an abrasive-cloth front face.

[Claim 2] It is the surface-control method of the abrasive cloth which uses together polish waste removal processing and dressing processing, and adjusts the front face of the abrasive cloth for smooth polish on the front face of a substrate. polish waste removal processing The processing which removes the polish waste which pressurized the liquid, injected on the surface of the abrasive cloth, and was got blocked in the abrasive-cloth front face, It is the processing which removes the polish waste which forced the irregularity of a plate on the surface of the abrasive cloth, was made to carry out relative rotation of both, and was got blocked in the abrasive-cloth front face. and/or, dressing processing Force the irregularity of a plate on the front face of an abrasive cloth on which polish waste was removed, and relative rotation of both is carried out. The processing which can be conspicuous, carries out the front face of an abrasive cloth, and reproduces irregularity on the surface of an abrasive cloth with the irregularity of a plate, And/or, the surface-control method of the abrasive cloth characterized by being the processing which pressurizes and injects a liquid on the front face of an abrasive cloth on which polish waste was removed, can be conspicuous, carries out the front face of an abrasive cloth, and reproduces irregularity on the surface of an abrasive cloth.

[Claim 3] It is the surface-control mechanism of the abrasive cloth characterized by being what performs removal of abrasive-cloth surface-lapping waste, and dressing on the front face of an abrasive cloth with a fluid pressure by having the surface-control section, and being the surface-control mechanism of the abrasive cloth which adjusts the front face of the abrasive cloth for smooth polish on the front face of a substrate, and the surface-control section's having two or more high-pressure water jet nozzles, and injecting the pressurized liquid on the surface of [nozzle /this] an abrasive cloth.

[Claim 4] When it has the following and a nozzle injects the pressurized liquid on the surface of an abrasive cloth, it is the surface-control mechanism of an abrasive cloth which has a fluid pressure, adjusts the front face of an abrasive cloth, and is characterized by a plate being what rubs irregularity on the surface of an abrasive cloth, and adjusts the front face of an abrasive cloth. It is the surface-control mechanism of the abrasive cloth which adjusts the front face of the abrasive cloth which has the surface-control section and grinds a substrate front face flat and smooth, and the surface-control section is a nozzle. The plate which has irregularity in a front face.

[Claim 5] The aforementioned nozzle is the surface-control mechanism of the abrasive cloth according to claim 4 characterized by arranging around a field with the irregularity of a plate.

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DETAILED DESCRIPTION

[Detailed Description of the Invention]
[0001]
[The technical field to which invention belongs] Especially this invention relates to the surface-control method of an abrasive cloth and the mechanism which it uses for carrying out polish flattening of the irregularity on the front face of a semiconductor, about the surface-control method of an abrasive cloth, and a mechanism.
[0002]
[Description of the Prior Art] The technology of smoothing a substrate front face by polish made the production process of a semiconductor substrate the start, and has been used in all fields. On the other hand, also in the device production process on a semiconductor substrate, the chemical machinery grinding method which carries out flattening of the irregularity of the front face formed in process of production, for example, the irregularity of a layer insulation film front face, by polish is being adopted in recent years. By this method, in order to perform flattening of an insulator layer unlike a comparatively softer abrasive cloth made from the nonwoven fabric used when grinding substrate front faces, such as a semiconductor substrate, the harder abrasive cloth which consists of material, such as foaming polyurethane, is used.
[0003] In using an abrasive cloth made from foaming polyurethane, while advancing polish, the irregularity on the front face of an abrasive cloth is embedded with an abrasive material or polish waste, smoothing of the surface irregularity is carried out and reduction that a polish rate falls gradually produces the abrasive cloth itself. In order to avoid this phenomenon, the abrasive-cloth surface control (henceforth conditioning) which used the diamond plate is usually performed. Drawing 10 is drawing showing the composition of the polish equipment used for such polish.
[0004] The polish equipment shown in drawing 10 consists of the substrate attaching part 6 holding a substrate, a polish table 3 on which the abrasive cloth 7 was stuck on the upper surface, an abrasive material feed hopper 8, and a conditioning mechanism (henceforth a conditioner) 2. Although rotation, rocking, and the pressurization mechanism attach to the substrate attaching part 6 and a conditioner 2 and the rolling mechanism attaches to the polish table 3, these are omitted on a drawing. The conditioner 2 has the diamond plate 5 which electrodeposited about 150-micrometer diamond particle in the metal plate.
[0005] If the procedure of polish is explained, an abrasive cloth 8 will be rotated first, passing an abrasive material on an abrasive cloth 7 from the abrasive material feed hopper 8, and an abrasive material will be spread all over an abrasive cloth 7. Next, substrate surface lapping is performed by forcing on an abrasive cloth 7 the substrate held at the substrate attaching part, rotating the substrate attaching part 6. It grinds by making a substrate rock to an abrasive cloth 7 if needed. As polish conditions, it is set as load =500 g/cm2 which forces rotational frequency =20RPM of an abrasive cloth 7, rotational frequency =20RPM of a substrate, and a substrate on an abrasive cloth 7, for example, and a substrate is ground.
[0006] Conditioning of abrasive-cloth 7 front face is performed by pulling up a substrate from an abrasive cloth 7 by the substrate attaching part 6 after a polish end, and pushing against an abrasive cloth 7, rotating a diamond plate 5 with a conditioner 2, while exchanging for the

substrate which next processes the substrate which processing finished. That is, by the diamond plate 5, it can be conspicuous, the front face of an abrasive cloth 7 is carried out, and the irregularity for polish is reproduced.
[0007] As conditioning conditions, it is set as load =100 g/cm2 which forces rotational frequency =20RPM of an abrasive cloth 7, rotational frequency =20RPM of a diamond plate 5, and a diamond plate 5 on an abrasive cloth 7, for example, and conditioning is performed.
[0008] The following substrate is ground after a conditioning end and polish and conditioning are repeated by turns henceforth.
[0009]
[Problem(s) to be Solved by the Invention] However, by the conventional abrasive-cloth surface-control method mentioned above, when a diamond is missing from a diamond plate 5 in the case of conditioning and a diamond enters between an abrasive cloth and a substrate during polish, a blemish may be attached to a substrate front face. Moreover, the capacity which smoothing of the front face of a diamond is carried out from a plate 5 even if there is no lack of a diamond, and carries out conditioning of the abrasive cloth declined, and there was a trouble that the polish rate of an abrasive cloth was not stabilized.
[0010] Thus, the cause which a diamond is missing from a plate 5, or wears it out is in conditioning conditions, especially a conditioner load being too high. As the mechanism of the polish rate recovery by conditioning was mentioned above, two, the effect which removes the polish waste got blocked in the irregularity on the front face of an abrasive cloth, and the effect of making the front face of the abrasive cloth itself by which smoothing was carried out reproducing irregularity, combine.
[0011] However, although the thing of the structure which electrodeposited diamond particle on the plate 5 is effective for reproducing irregularity on a front face, for removing polish waste, it will need a big load for it not being efficient and fully removing polish waste, and, as a result, will cause lack and wear of a diamond.
[0012] The purpose of this invention is to offer the surface-control method of an abrasive cloth and the mechanism which protect a substrate and destabilization of the polish rate accompanying the fall of conditioning capacity is suppressed.
[0013]
[Means for Solving the Problem] The surface-control method of the abrasive cloth which starts this invention in order to attain the aforementioned purpose is the surface-control method of the abrasive cloth which adjusts the front face of the abrasive cloth for smooth polish on the front face of a substrate, it pressurizes a liquid, injects it on the surface of an abrasive cloth, and removes the polish waste got blocked in the abrasive-cloth front face, and performs dressing on the front face of an abrasive cloth, and reproduces irregularity on an abrasive-cloth front face.
[0014] Moreover, the surface-control method of the abrasive cloth concerning this invention It is the surface-control method of the abrasive cloth which uses together polish waste removal processing and dressing processing, and adjusts the front face of the abrasive cloth for smooth polish on the front face of a substrate. polish waste removal processing The processing which removes the polish waste which pressurized the liquid, injected on the surface of the abrasive cloth, and was got blocked in the abrasive-cloth front face, It is the processing which removes the polish waste which forced the irregularity of a plate on the surface of the abrasive cloth, was made to carry out relative rotation of both, and was got blocked in the abrasive-cloth front face. and/or, dressing processing Force the irregularity of a plate on the front face of an abrasive cloth on which polish waste was removed, and relative rotation of both is carried out. It is the processing which pressurizes and injects a liquid on the front face of an abrasive cloth on which the processing which can be conspicuous, carries out the front face of an abrasive cloth, and reproduces irregularity on the surface of an abrasive cloth with the irregularity of a plate, and/or polish waste were removed, can be conspicuous, carries out the front face of an abrasive cloth, and reproduces irregularity on the surface of an abrasive cloth.
[0015] Moreover, the surface-control mechanism of the abrasive cloth concerning this invention has the surface-control section, it is the surface-control mechanism of the abrasive cloth which adjusts the front face of the abrasive cloth for smooth polish on the front face of a substrate,

and the surface-control section performs removal of abrasive-cloth surface-lapping waste, and dressing on the front face of an abrasive cloth with a fluid pressure by injecting the liquid which had and pressurized two or more high-pressure water jet nozzles on the surface of [nozzle / this] an abrasive cloth.

[0016] Moreover, the surface-control mechanism of the abrasive cloth concerning this invention It is the surface-control mechanism of the abrasive cloth which adjusts the front face of the abrasive cloth which has the surface-control section and grinds a substrate front face flat and smooth. the surface-control section It consists of a nozzle and a plate which has irregularity in a front face, and when a nozzle injects the pressurized liquid on the surface of an abrasive cloth, it has a fluid pressure and the front face of an abrasive cloth is adjusted, and a plate rubs irregularity on the surface of an abrasive cloth, and adjusts the front face of an abrasive cloth.

[0017] Moreover, the aforementioned nozzle is arranged around a field with the irregularity of a plate.

[0018] The liquid fundamentally pressurized from the high-pressure water jet nozzle is injected on the surface of an abrasive cloth, and polish waste is removed from the front face of an abrasive cloth, and irregularity is reproduced on the surface of an abrasive cloth.

[0019]

[Embodiments of the Invention] Hereafter, drawing explains this invention.

[0020] In drawing, the surface-control mechanism of the abrasive cloth concerning this invention as fundamental composition By having two or more high-pressure water jet nozzles, injecting the liquid pressurized from this nozzle on the surface of an abrasive cloth, adjusting the front face of an abrasive cloth with the fluid pressure, and adjusting a fluid pressure Removal of the polish waste from an abrasive-cloth front face and dressing on the front face of an abrasive cloth (concavo-convex reproduction) are performed by the high-pressure water jet nozzle independent, and a surface control is performed, or the combined use with a high-pressure water jet nozzle and a plate with irregularity performs a surface control. Next, an operation form explains this invention concretely.

[0021] It is drawing in which the cross section in which drawing 1 shows the operation form 1 of this invention, and drawing 2 show this bottom plan view, and drawing 3 shows a surface-control state. In addition, to drawing 3 , the substrate attaching part 6 and the abrasive material feed hopper 8 which were shown in drawing 10 are omitted.

[0022] The surface-control mechanism of the abrasive cloth which starts the operation form 1 of this invention in drawing 1 consists of nozzle-body 1a, and two or more high-pressure water jet nozzles 1 and 1 —.

[0023] Nozzle-body 1a has passage 1b inside, liquid intake 1c which takes in a pressurization liquid is connected to passage 1b, 1d of branch passage branches from passage 1b, and 1d of the branch passage is arranged in the shape of a straight line. A nozzle 1 and 1 — are connected to 1d of each branch passage of nozzle-body 1a, respectively.

[0024] Nozzle-body 1a turns a nozzle 1 below, is attached in a conditioner 2, and is installed above the polish table 3 possible [rise and fall]. Moreover, nozzle-body 1a is installed in radial [of the rotating polish table 3] by the rockable. What has the general-purpose mechanism in which nozzle-body 1a is made to go up and down and rock is used. Moreover, the abrasive cloth 7 is stuck on the upper surface of the polish table 3.

[0025] In the operation form 1, polish for smoothing on the front face of a substrate is performed with the abrasive cloth 7 of the polish table 3. When the polish is completed, nozzle-body 1a is dropped, the height position of a nozzle 1 is adjusted, and the liquid pressurized from the high-pressure water jet nozzle 1 is turned to the abrasive cloth 7 of the polish table 3, and is injected. An abrasive cloth 7 makes it rotate, and makes radial [of the polish table 3] rock nozzle-body 1a to an abrasive cloth 7 in that case.

[0026] If the liquid pressurized from the high-pressure water jet nozzle 1 is injected by the abrasive cloth 7, the polish waste got blocked in the front face of an abrasive cloth 7 will have floated in the front face by the fluid pressure, and it will be eliminated by the stream from the front face of an abrasive cloth 7.

[0027] Nap raising of the front face of an abrasive cloth 7 is simultaneously promoted by the

pressure of the liquid from the high-pressure water jet nozzle 1, dressing is performed, and irregularity is reproduced by the front face of an abrasive cloth 7.
[0028] Although conditioning is performed as processing while grinding a substrate as mentioned above An example of conditioning conditions Diameter of jet =2mmphi which injects high-pressure water from rotational frequency =60RPM of an abrasive cloth 7, jet output =500 kg/cm2 of the high-pressure water injected from a nozzle 1, and a nozzle 1, rocking speed of nozzle-body 1a = The center of the rocking range = abrasive cloth 7 of 1cm/[a second and] and nozzle-body 1a - a periphery, The number of times of rocking of nozzle-body 1a = it is 1 time. This condition cannot be overemphasized by that an optimum value changes with the conditions of the array of a high-pressure water jet nozzle, the material of an abrasive cloth, and the dressing of an abrasive cloth etc.
[0029] It is drawing where the cross section in which drawing 4 shows the operation form 2 of this invention, and drawing 5 explain this bottom plan view, and drawing 6 explains a conditioning state.
[0030] Nozzle-body 1a is formed in the shape of a disk, nozzle-body 1a is equipped with two or more high-pressure water-injection nozzles 1, and, moreover, the sense of a nozzle 1 is made to incline in the fixed direction to the medial axis of nozzle-body 1a with the operation form 2 of this invention.
[0031] With this operation form, when rotating nozzle-body 1a and making it the sense change 360 degrees like the locus 4 of high-pressure water in the liquid injected from a nozzle 1 like drawing 6 , the liquid from a nozzle 1 is made to be injected in a large area by the abrasive cloth 7.
[0032] Although the above operation form explained the case where performed removal of the polish waste from an abrasive-cloth front face, and dressing on the front face of an abrasive cloth (concavo-convex reproduction) by the nozzle independent, and the surface control of an abrasive cloth was performed, it is not restricted to this.
[0033] The combined use with conditioner 2a equipped with the conditioner 2 equipped with the high-pressure water-injection nozzle 1 as shown in drawing 2 and the plate 5 with irregularity, for example, the plate which electrodeposited diamond particle like drawing 7 , may be made to perform the surface control of an abrasive cloth 7. In this case, the polish waste got blocked in the irregularity on the front face of an abrasive cloth based on injection of the high-pressure water from a nozzle 1 is removed, and irregularity is reproduced on an abrasive-cloth front face with the plate 5 which electrodeposited diamond particle. The conditioning conditions by the high-pressure water jet nozzle 1 at this time 1cm/second in high-pressure water injection-pressure =100kg/cm2 from rotational frequency =60RPM of an abrasive cloth 7, and a nozzle 1, diameter of high-pressure water jet =2mmphi, and rocking speed, a rocking range = table center - table periphery, the number of times of rocking = It sets up at once. Moreover, the conditioning conditions by the plate 5 which electrodeposited diamond particle are set as rotating-speed =20RPM, substrate rotational frequency =20RPM, and load 30 g/cm2.
[0034] Since two effects for which conditioning is asked are made to share with two respectively effective methods, both of the conditions are weaker than the case where conditioning is performed independently. Therefore, the danger of the diamond omission from a player 5 becomes small sharply, and is small. [of degradation of the conditioning effect by diamond wear of a plate 5]
[0035] Drawing 7 exchanges abrasive cloths for every 200 processing substrate number of sheets, and plots the amount of falls of the polish rate for every abrasive cloth to the processing number of sheets of a conditioner. Although the conditioning effect will fall remarkably in a conventional method if 8000 conditioning processing number of sheets is exceeded, when the adjustment method is independently used using the nozzle by this invention, there is no fall of the conditioning effect. Moreover, when the nozzle and plate by this invention are used together, the fall of the conditioning effect is remarkably small. Since each condition can be made light in combined use of the nozzle and plate by this invention and drive capacity of a diamond conditioner and pumping power of high-pressure water can be made small, it also becomes possible from a high-pressure water independent case to lower equipment cost as a result.

[0036] Moreover, as an example which uses together the nozzle and plate by this invention, you may use the method of performing another side in succession [after performing separately conditioning by the diamond plate 5, and conditioning by the high-pressure water jet nozzle 1 and performing either].
[0037] Drawing 8 and the conditioner which made two methods unify as shown in 9 may perform simultaneously. The high-pressure water jet nozzle 1 is allotted to the circumference of the plate 5 with which diamond particle was electrodeposited, and the example of drawing 8 and the conditioner shown in 9 performs conditioning by rocking an abrasive-cloth top, rotating. Of course, even if it performs separately conditioning by the diamond, and conditioning by high-pressure water using this conditioner, it is satisfactory in any way.
[0038]
[Effect of the Invention] As explained above, the polish waste got blocked in the dressing on the front face of an abrasive cloth and the irregularity on the front face of an abrasive cloth by injecting a liquid to an abrasive cloth by high pressure according to this invention can be removed simultaneously, and a polish rate can be kept constant. Since there are no worries about solid omission at this time unlike the conventional method of rubbing solid-states, such as a diamond, against an abrasive cloth, there is no possibility of making a polish substrate producing a blemish, and there is also no change of the surface-control effect by surface degradation of a solid-state.
[0039] Moreover, conditioning by the high-pressure water jet nozzle and conditioning by the plate which electrodeposited diamond particle can be used together, injection of a high-pressure fluid can perform removal of polish waste in this case, the conditions of the surface control by the diamond etc. will become light compared with a conventional method, and degradation of the danger of omission and the surface-control effect by wear can be mitigated greatly.

[Translation done.]

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DESCRIPTION OF DRAWINGS

[Brief Description of the Drawings]
[Drawing 1] It is the cross section showing the operation gestalt 1 of this invention.
[Drawing 2] It is this bottom plan view.
[Drawing 3] It is drawing showing the state of conditioning.
[Drawing 4] It is the cross section showing the operation gestalt 2 of this invention.
[Drawing 5] It is this bottom plan view.
[Drawing 6] It is drawing showing the state of conditioning.
[Drawing 7] Book
[Drawing 8] It is the cross section showing the operation gestalt 3 of this invention.
[Drawing 9] It is this bottom plan view.
[Drawing 10] It is drawing showing the conventional example.
[Description of Notations]
1 High-Pressure Water Jet Nozzle
2 Conditioner
3 Polish Table
4 Tracing of High-Pressure Water
5 Diamond Plate
6 Substrate Attaching Part
7 Abrasive Cloth
8 Abrasive Material Feed Hopper

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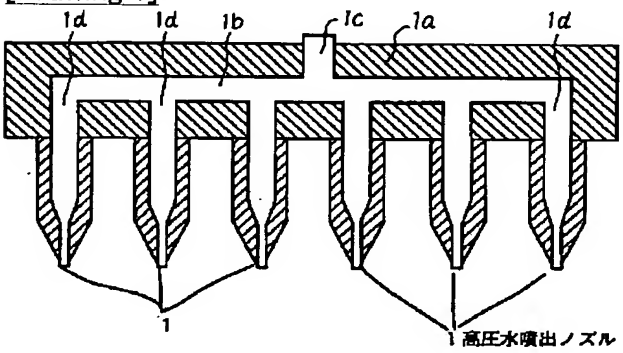
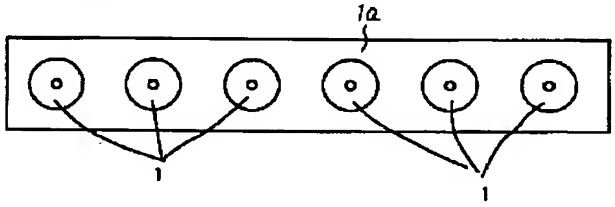
DRAWINGS

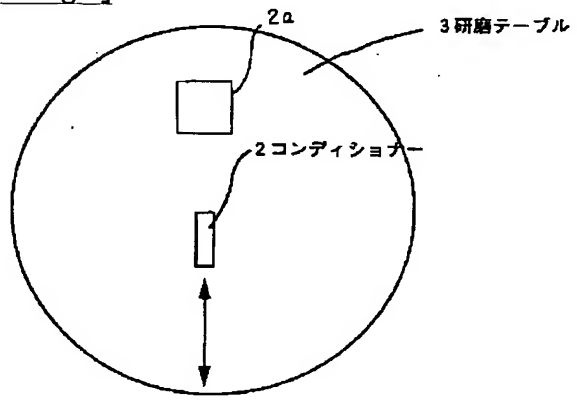
[Drawing 1]



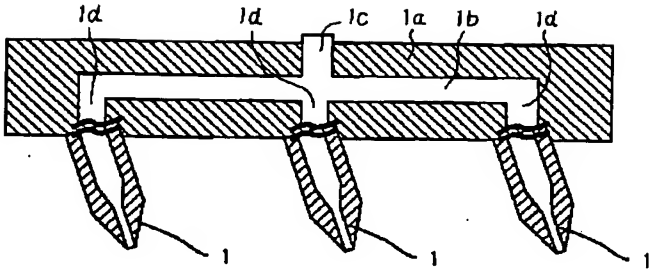
[Drawing 2]



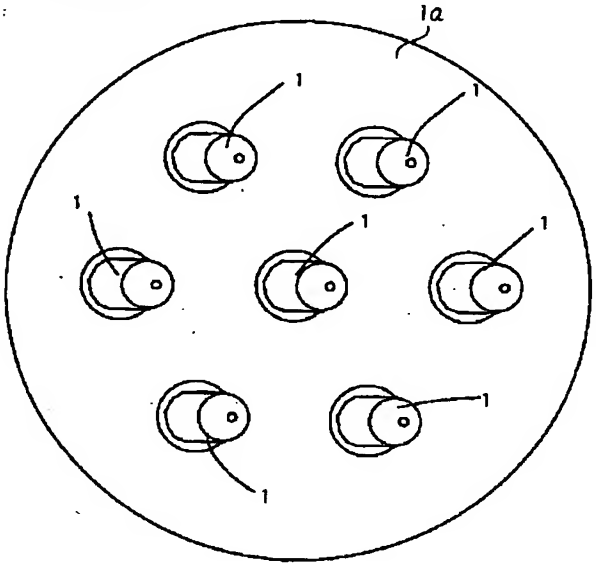
[Drawing 3]



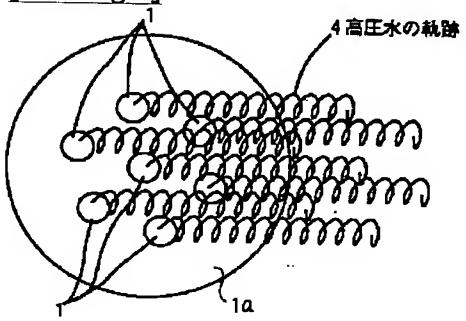
[Drawing 4]



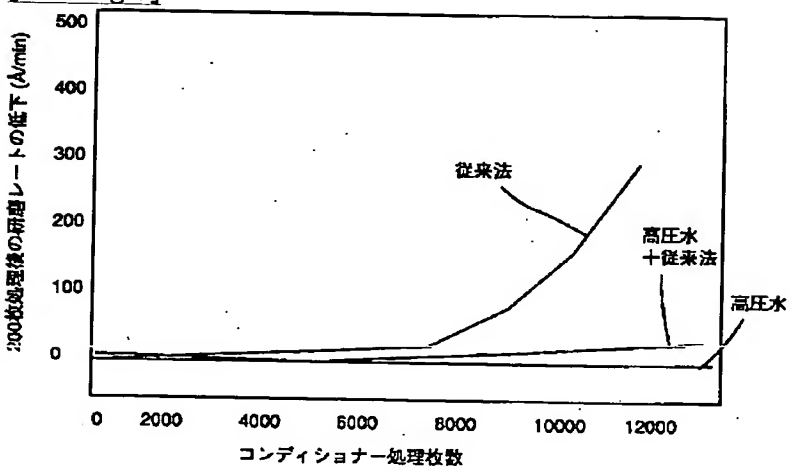
[Drawing 5]



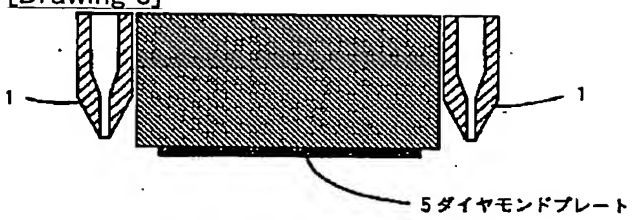
[Drawing 6]



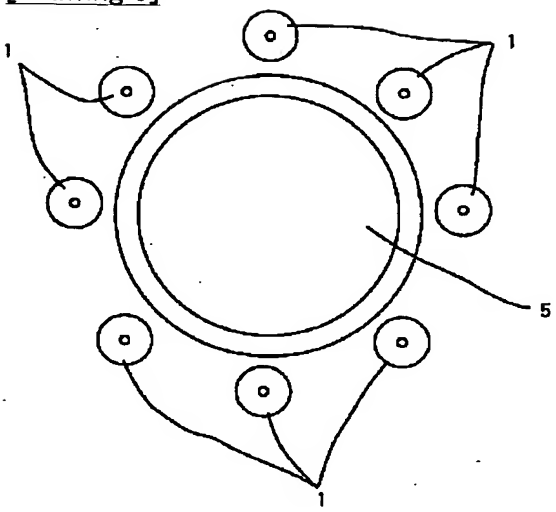
[Drawing 7]



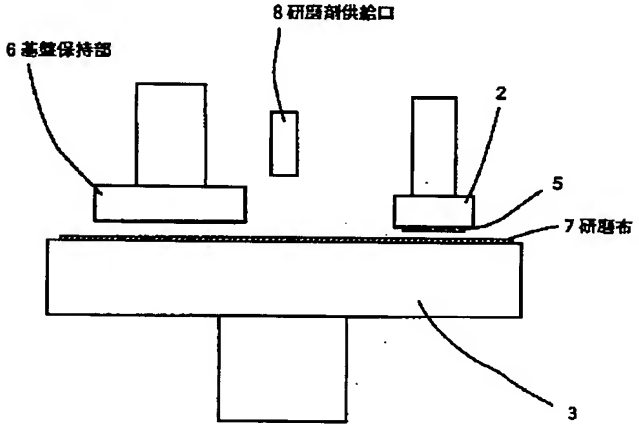
[Drawing 8]



[Drawing 9]



[Drawing 10]



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